PUBLIC ABSTRACT

Applicant (primary) name: Green Earth Industries, LLC

Applicant=s address: 45600 Terminal Drive, Dulles, VA 20166
Street City State Zipcode

Team Members (if any): Brookhaven National Lab
(listing represents only participants at time of application, not necessarily final team membership)

(Use continuation sheet if needed.)

Proposal Title: Effect of Amino Acids on Coal Purifying Bacteria

Commercial Application: ÿ New Facilities **9** Existing Facilities

9 Other, Specify: _____

Technology Type:

Estimated total cost of project:
(May not represent final negotiated costs.)

Total Estimated Cost: $ 996,900

Estimated DOE Share: $ 498,450

Estimated Private Share: $ 498,450

PUBLIC ABSTRACT (cont=d)

Anticipated Project Site(s): TBD

Location (city, county, etc.) State Zipcode

Location (city, county, etc.) State Zipcode

Location (city, county, etc.) State Zipcode

Type of coal to be used: _____ _____

Primary Alternate (if any)

Size or scale of project: _____

Tons of coal/day input

And/or

_____ Megawatts, Barrels per day, etc.

Other (if necessary)

Duration of proposed project: 12

(From date of award) (Months)

PRIMARY CONTACT:

For additional information, James R. Holbein

interested parties should contact: Name

_____

Position

(703) 689-4675

Telephone Number

Green Earth Industries

Company

Jim.holbein@geiindustries.com

e-mail address

As above

Address

_____

City State Zipcode

Alternative Contact:

_____

Name

_____

Position

( )

Telephone Number

_____

Company

_____

e-mail address

_____

Address

_____

City State Zipcode

PUBLIC ABSTRACT (cont=d)

Brief description of project:

Effect of Amino Acids on Coal Purifying Bacteria

Public Abstract

The proposed project represents a modest, but important, first step in the use of amino acids to enhance the biological activity of microorganisms that convert coal into useful liquid and gaseous products that will have a minimal impact on the environment. This approach has many advantages over flue-gas desulfurization, selective catalytic and non-catalytic reduction, and other conventional applications of industrial chemistry (typically applied at the "end-of-pipe") to reduce the impact of emissions from coal-fired power generating facilities on human health and the environment. Biological treatment of coal has already demonstrated its ability to remove several compounds present in coal that are known to contribute to the production of greenhouse gases, photochemical smog, and particulate matter.

GEI is proposing a two-phase project designed to evaluate the ability of its amino acids to enhance the biologically-based treatment of coal prior to use as an energy source. Although the ability of certain microbial populations to bio-assimilate coal has been demonstrated, the need to shorten processing time and increase the yield of useful products remain obstacles remain obstacles to the ultimate commercialization of this approach. Dr. Mow Lin of Brookhaven National Laboratory (BNL) has used selected bacteria strains to treat low-grade coals as well as heavy crude oils.1 The results to-date indicate that significant amounts of nitrogen, sulfur, oxygen (NSO), and trace metals were reduced in a manner that would make the resulting treated coal a much cleaner fuel source. In the first phase of the project, GEI will collaborate with Dr. Lin to determine the effects of GEI's amino acids on microorganisms used to improve the fuel quality of coal.

The laboratory work in phase I of the project is a logical follow-on to efforts already completed by Dr. Lin. The key steps in this laboratory study are:

1. Obtain coal samples from target sites

2. Incubate coal samples with nutrients (with and without GEI's amino acids)

3. Isolate the strains that grow with the coal samples

4. Screen microorganisms for strains that improve the quality of coal with respect to NSO, and ash content.

5. Analyze for the conversion of coal into lighter fractions.

The results of these steps will provide information on the effects of nutrients in combination with GEI's amino

1 See Brookhaven article in Appendix D.

acids in improving the ability of selected strains of microorganisms to reduce the NSO and ash content of coal. This will include an evaluation of optimal conditions for using the amino acids in GEI's product as an accelerator for NSO and ash reduction.

The results of this investigation may then be used to plan and implement a commercial-scale field-test of the technology that would be the second phase of this project. This might be in the form of an open coal bed where nutrients and GEI's amino acids are applied, or in a pipeline/coal slurry injection system where the pre-treatment of coal is initiated and completed during delivery to the point of use. Although it is premature to submit a detailed Scope of Work and cost for such a project, a basic outline of the overall approach can be provided as follows:

- Examine the feasibility of several methods for using amino acids on a commercial-scale
- Select one or two candidate methods
- Pilot-test each method to establish which is better suited for a large-scale test
- Examine the engineering, economic, and environmental implications of testing the more feasible method on a commercial scale
- Plan and conduct a commercial-scale test

Because the use of amino acids in this application can have positive effects on the content of several pollutant precursors in coal, it is expected that optimizing the process will require a significant commitment of research and development time and money. The initial test should therefore have modest goals that would be guided by the results of the feasibility studies and pilot-tests. For example, it could be focused on sulfur removal.